

## Taxonomy and distribution of a new *Cossura* species (Annelida: Polychaeta: Cossuridae) from New Zealand

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*Abstract.*—The little-known polychaete family Cossuridae is given a detailed taxonomic record from New Zealand for the first time and its sole representative, *Cossura consimilis* new species, is described. The dorsal filament of *C. consimilis* originates on the anterior part of chaetiger 3, and there are at least 28 anterior-region chaetigers (usually 30). Distribution records are mapped from over 70 locations; *C. consimilis* is widespread in the New Zealand region, with most records from the nearshore subtidal, but the species has been found from extreme low water to the mid-continental slope (0–2330 m). The presence of benthic juveniles with extremely long capillaries may indicate a semi-planktonic dispersal phase occurs post-settlement. The taxonomic characters of all cossurid species are tabulated and discussed; the genus *Cossurella* is newly synonymized with *Cossura*.

The polychaete family Cossuridae, unique among polychaetes for possessing just one long branchial filament, has surprisingly not previously gained a substantive taxonomic record for New Zealand. Early polychaete collectors in New Zealand failed to find cossurids during the initial exploration of the fauna (Glasby & Read 1998), and even in recent ecological reports there are relatively few records, and only since the late 1970s. Reasons for this are examined later. In adjacent Australian waters the family has been reported at generic level from southern and eastern coasts, but not identified to species (Hutchings 2000). The brief description in Hutchings & Murray (1984) may indicate a different species from that in New Zealand.

The first cossurids collected in New Zealand waters are from hitherto unpublished records. Specimens were collected in Milford Sound by the Danish Galathea Expedition in 1952, and in Tasman Bay by the New Zealand Oceanographic Institute [now National Institute of Water & Atmospheric Research Ltd. (NIWA)] in 1960. *Cossura*

specimens were subsequently collected from Port Pegasus, Stewart Island in 1972 (survey of J. Lowry 1979), and from Whangarei Harbour in 1977 (survey of R. Mason & L. Ritchie 1979). Now there are many cossurid specimens in the NIWA collection, mostly taken within the last few years from intensive localised surveys.

The first ecological reports of cossurids in the literature are from coastal Hawke Bay (Knox & Fenwick 1978, 1981 (same data), Roper et al. 1989) as an unassigned *Cossura*. In the initial report the worms were found offshore from an ocean outfall at almost all stations from 4 to 17 meters depth. Maximum cossurid density was only about 1900 m<sup>-2</sup> about 2 km offshore. At about the same time the checklist of Day & Hutchings (1979) noted the presence of cossurids in New Zealand, but without giving a locality record. More recently a *Cossura* species was reported from NIWA stations off the northern west coast of South Island (Probert & Grove 1998), and from near Auckland (Cole 1997, and Cole, pers. comm.).

For this paper I have examined all NIWA material and re-examined specimens from the occurrences mentioned above; voucher material of all except the *Galathea* specimens is held in the NIWA collection.

The genus *Cossura* was monotypic until 1955, with *C. longocirrata* Webster & Benedict, 1887 of coastal Maine, U.S.A. as the sole species, and was regarded as belonging in the Cirratulidae until Day (1963) removed it to a family of its own. Cossurids are unique for their type of buccal apparatus as well as their single branchial filament, and are without close affinities to any other polychaete family (Fauchald & Rouse 1997, Rouse & Fauchald 1997). However, there is little diversity in their external morphology and specimens are rarely intact; although 23 cossurid species are named, many are unsoundly differentiated and based on inadequate material. Conversely, there is no evidence yet for the existence of cryptic cossurid species undetectable from gross appearance, but this remains a possibility as the biology of cossurids is poorly known.

#### Family Cossuridae Day

##### *Cossura* Webster & Benedict, 1887

*Cossura* Webster & Benedict, 1887:743.

Type species *C. longocirrata* Webster & Benedict, 1887. (emended).

*Cossurella* Hartman, 1976:234. Type species *C. dimorpha* Hartman, 1976.

*Heterocossura* Wu & Chen, 1977:100. Type species *H. aciculata* Wu & Chen, 1977.

*Diagnosis*.—Prostomium conical without appendages, without eyes; peristomium achaetigerous, usually subdivided at least dorsally by a transverse furrow. Single branchial filament arising middorsally on chaetiger 2, 3, 4, or 5. Chaetiger one uniramous, thereafter chaetigers biramous; chaetal lobes rarely present. A variable number of narrow anterior chaetigers with chaetal fascicles at anterior chaetal borders; grading thereafter into longer, often beaded

chaetigers with chaetal fascicles emerging at midlength. Anterior chaetae hirsute capillaries (usually in two distinct rows, anterior row with shorter, thicker chaetae); from midbody chaetae fewer and less hirsute, always several per fascicle unless thickened chaetae or short spines present; last few segments may be achaetigerous. Pygidium with three anal cirri, which may be branched; intercirral perianal processes may be present.

*Remarks*.—The following analysis of the taxonomic characters used in cossurids presents some points of difference from earlier reviews and also a re-evaluation of *Cossurella*.

Misinterpretations in past *Cossura* descriptions have been noted (Fournier & Petersen 1991, Bachelet & Laubier 1994, Hilbig 1996), and, while there is agreement that no achaetigerous post-peristomial segment exists, there is still uncertainty over the demarcation of prostomium and peristomium, difficult to determine in many Polychaeta, although not currently used as a taxonomic character in cossurids. The prostomial-peristomial region usually appears to have two transverse furrows dividing it into three parts, although the clarity of definition is dependant on the state of contraction of the worm. I suggest the prostomium is not subdivided, as has been interpreted by Fournier & Petersen (1991:70) for *Cossura longocirrata* and adopted by Hilbig (1996) for other cossurids. That would be unusual in polychaetes. The zone they regard as a posterior part of the prostomium is more probably the anterior part of the peristomium, as is indicated by Tzvetlin (1994) in his morphological study, and consistent with the earlier usage of Ewing (1984), and with other Polychaeta where nuchal organs are close to the posterior edge of the prostomium. So it is the peristomium, not the prostomium which may appear to be subdivided dorsally, and the peristomium which surrounds the mouth ventrally as expected.

The few external characters useful to

separate species are the point of origin of the branchial filament, the number of anterior region chaetigers, the pygidial ornamentation, and the sometimes-distinctive pattern on the anterior body when stained with methyl green (see Hilbig 1996). The major character is the precise point of origin of the branchial filament, which always occurs between chaetigers 2 to 5, usually just anterior or posterior to the segmental division. In some species this location is unique, but in 16 of the 23 known cossurids the origin is adjacent the segmental division between chaetigers two and three.

A second major character is the number of chaetigers of the anterior region (the so-called 'thoracic' region, but see Bhaud (1998) regarding the inappropriate use of this term for polychaetes) in which segments are wider than long, chaetal fascicles are immediately behind the segmental division, and gametes are always absent. In this region longitudinal musculature mostly fills the body cavity (Rouse & Tzetlin 1997). This musculature is absent in the middle body where the body wall is thin and the coelomic space is either 'empty' or variably filled with gametes.

A number of authors have been unable to find a clear delineation between body regions. Additionally, most authors have been vague on how they determined when the anterior region ceased, and whether, when a chaetiger range was given, it represented a range between several individuals or a transitional zone in one specimen. The most information on variation is provided by Fournier and Petersen (1991) using material they accumulated of *Cossura longocirrata*. Its anterior region was between 16 and 21 segments long, with a transition in an individual over one or two segments. In all known cossurids the range in the number of thoracic chaetigers is 13 to 35. Differences are likely to be indicative rather than definitive when comparing species, unless based on very extensive meristic data.

The third major feature is the structure of the terminal anus and anal cirri. There is a

raised perianal pad usually with three well-separated, very thin, unbranched anal cirri which may be 2–3 body widths in length, but cirri that are branched, short or solitary have been reported and regarded as diagnostic. In view of the delicacy of these cirri, a single individual with cirri short or missing may be a damaged specimen, and it is doubtful if all such reports describe true species features. The perianal pad may bear radial corrugations, and in one species the pad has distinctive additional short cirri (the 'intercirral' processes) that are not retractable into the anus (Jones 1956).

The chaetal types and arrangements of all cossurids are very similar. In the anterior body there are two rows of capillaries which are distally hirsute, especially along the leading edge. Progressively along the body the number of capillaries decreases and they are more slender and less hirsute. Chaetigers are biramous except for the first. Short thickened chaetae may be present in some cossurids from mid-body, and four species with this character have been separated as the cossurid genus *Cossurella*, Hartman (Hartman, 1976). These spine-like chaetae are slightly hooked, and either occur one per fascicle, or accompanied by a single capillary (*Cossura sima* Fauchald, 1972, juveniles of *C. pettiboneae* (Ewing, 1987)). There are no other features the four have in common, and I consider separation at genus-level is unwarranted and at present unhelpful for cossurid systematics. A fifth species, *C. pseudakaina* (Ewing, 1987) initially placed in *Cossurella*, does not have this type of spine-like chaetae; instead there are single, basally-thickened hairy capillaries, which when broken appear to be blunt spines. This species does not belong with the other four, and its possession of only one chaeta per fascicle posteriorly suggests this cannot be used as a character to support *Cossurella* itself. Accordingly I maintain *Cossurella* and *Heterocossura* are junior synonyms of *Cossura*. *Heterocossura* was previously synonymized with *Cossurella* by Gardiner & Wilson (1979).

*Cossura consimilis*, new species

Figs. 1–4

*Diagnosis.*—Dorsal filament originating from anterior median surface of chaetiger 3. Anterior region of at least 28 chaetigers, and adult body with a total of at least 90 chaetigers. Spine setae absent. Pygidium divided vertically into two lobes, with three long cirri and without additional short cirri.

*Holotype.*—NIWA type collection H-704. A complete specimen, length 10 mm for 89 chaetigers and 0.46 mm wide at chaetiger 10, collected by NIWA divers in a hand-corer sample at NIWA station Z9253 (Transect 7 core 5), 26 m, sandy mud, 15 Mar 1998.

*Type locality.*—Big Glory Bay, Stewart Island, 46°58'54"S, 168°7'31"E.

*Description.*—The longest of 816 specimens available for study was incomplete at 17 mm for 79 chaetigers and 0.34 mm wide at chaetiger 10. The few complete specimens ranged from the smallest at 1.8 mm long for 26 chaetigers and 0.22 mm wide, up to the holotype with dimensions as above. The range of widths measured at chaetiger 10 was 0.22–0.66 mm (mean = 0.46 mm,  $n = 70$ ).

Prostomium conical, dorso-ventrally flattened, with bluntly rounded tip. Eyes absent; low transverse ridges of dorsal nuchal organs visible at posterior lateral margin (Fig. 1A). Peristomium usually appearing subdivided, second longer part with the transverse mouth slit on its anterior ventral border. Anterior segments occasionally appearing weakly biannulated. Dorsal branchial filament originating on anterior median border of chaetiger 3, level with chaetal fascicles, with uniform proximal diameter, gently tapering distally, extending to about chaetigers 30–45, or nearly half the body length.

Chaetal fascicles emerging from anterior edges of each segment in the anterior body, but from about chaetiger 30 onwards emerge mid-chaetiger (Big Glory sample with range 28–32, mean = 30.33,  $n = 21$ ).

Over the next few chaetigers the body widens and deepens and becomes more rounded in section, with longer chaetigers, lesser constriction between segments (especially if gametes are present—transition to so-called abdominal region), and more slender chaetae. Segments in posterior third of body are as long as those of the middle region, but appear more bead-like with a lateral dome-like parapodial base bearing the chaetal fascicle, except in far posterior segments, which are short with only slight indentation between them (Fig. 1C). All chaetigers after the first are biramous with a small gap between fascicles in most chaetigers. All anterior fascicles of chaetae in closely situated anterior and posterior rows. Chaetiger 1 with up to 4 chaetae per row, succeeding chaetigers with up to 9 per row. Numbers of noto- and neurochaetae similar, but in each posterior row often one more chaeta. Chaetae in single rows from mid-body, about 4 per fascicle. All chaetae of one basic type of curved capillary, with dense fine hairs covering the convex anterior face of the blade, and with tapering, fine smooth tips (Fig. 2). Anterior row of anterior body chaetae may appear almost spine-like at low magnification, and taper abruptly; posterior row of chaetae of uniformly thinner diameter and with longer tips, with the fascicle spread out fan-like, extending half a body height above and below the body and overlapping succeeding chaetae. Mid-body chaetae long and nearly smooth, posterior body chaetae shorter. Pygidium vertically cleft with three long very fine cirri, up to 1.8 mm long; medial cirrus arising ventral to anal orifice; perianal pad sometimes appearing corrugated or creased but without other processes (Fig. 1C). Pygidium preceded by several narrow segments, with only last 2–3 achaetigerous.

After methyl green staining the prostomium tip is always clear, with the heaviest staining immediately behind, and less intensive staining dorsally to posterior chaetiger 2 (Fig. 1B). Posterior to the pre-branchial region there is a less-stained dorsal median

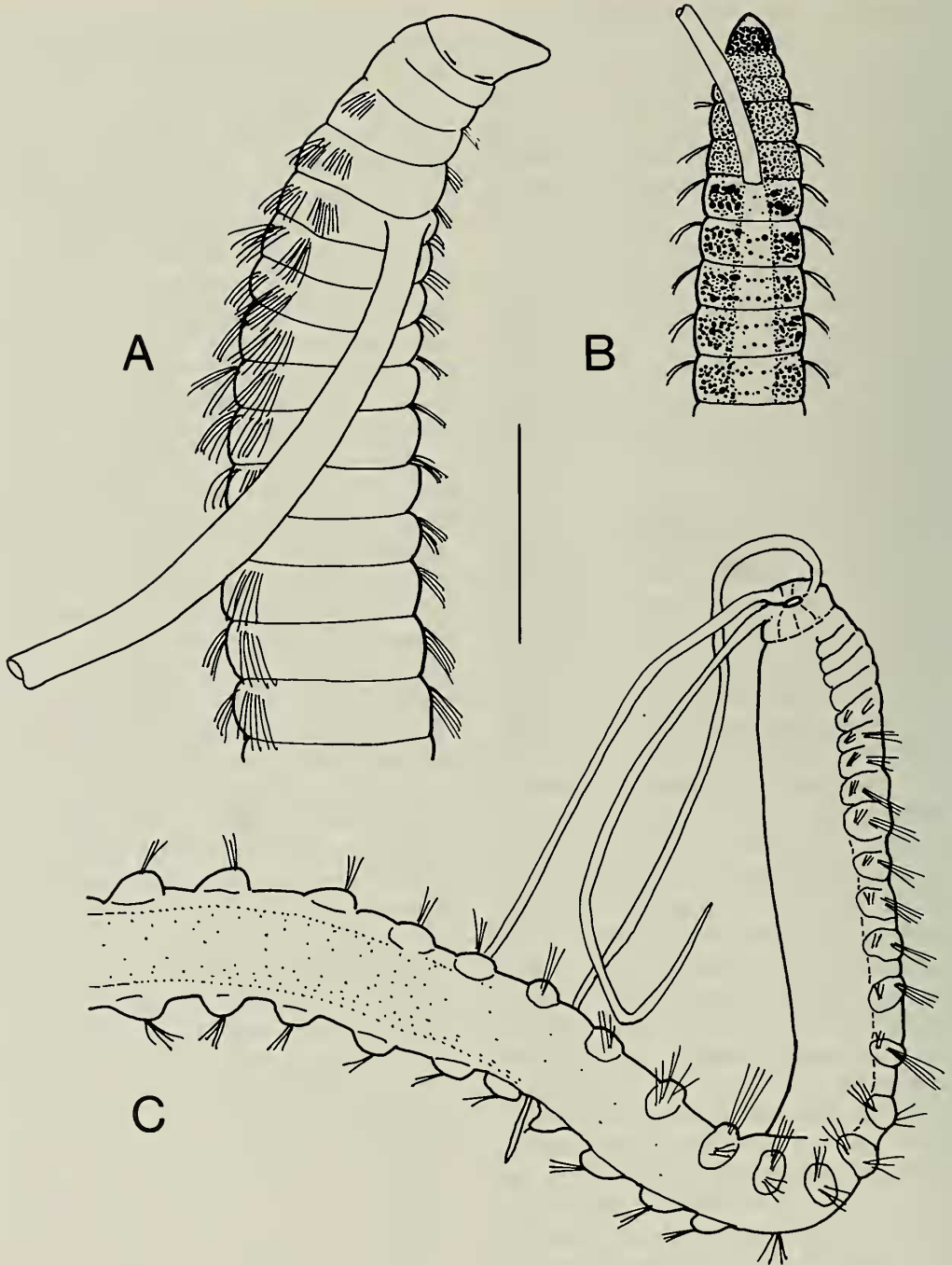


Fig. 1. *Cossura consimilis*, new species. A. Anterior dorsal region. B. Anterior dorsal region methyl-green staining pattern. C. Posterior region (body twisted from ventral to lateral view). Scale 0.5 mm (A and C), 1 mm (B).



Fig. 2. *Cossura consimilis*, new species. Scanning electron microscope micrograph anterior lateral view of notochaetal fascicle of chaetiger 3. Scale 10  $\mu$ m.

strip continuing for a few chaetigers, creating the appearance of block-like lateral patches. Ventrally there are similar median and lateral pigment blocks. In better preserved specimens the staining has a distinct granular appearance as taken up by individual cells, particularly at the margin of 'blocks' (Fig. 1B).

Some juvenile specimens of 30–40 segments (collected in autumn at Clive, Hawke Bay—see material examined) had extraordinarily-long, fine, straight chaetae in both fascicles in the posterior two thirds of the body (from about chaetiger 13) instead of the usual short curved capillaries, with each chaeta up to 1.8 mm long compared to a body width of 0.25 mm (Fig. 3).

*Remarks.*—As far as is known *Cossura consimilis* is unique to New Zealand seas. If this is not the case its extensive distribution indicates a lengthy establishment in

New Zealand. Specimens occurred in muddy sediments over a depth range from extreme low water at Waiheke Island to 2330 meters depth south of the Chatham Rise, and from the far north to the far south of the New Zealand mainland islands (Fig. 4). *Cossura consimilis* has yet to be recorded from nearshore at the Chatham Islands, but seems likely to occur throughout the New Zealand region where there is suitable habitat. The late discovery of cossurids is probably because pioneering collectors simply overlooked the worms due to their small size, low density, and largely subtidal occurrence (*C. consimilis* probably never occurs exposed in the intertidal: zero depth records notwithstanding). Cossurids are also relatively nondescript in appearance, but it is very unlikely they were previously simply discarded as of no particular interest. Finally, while cossurids may increase

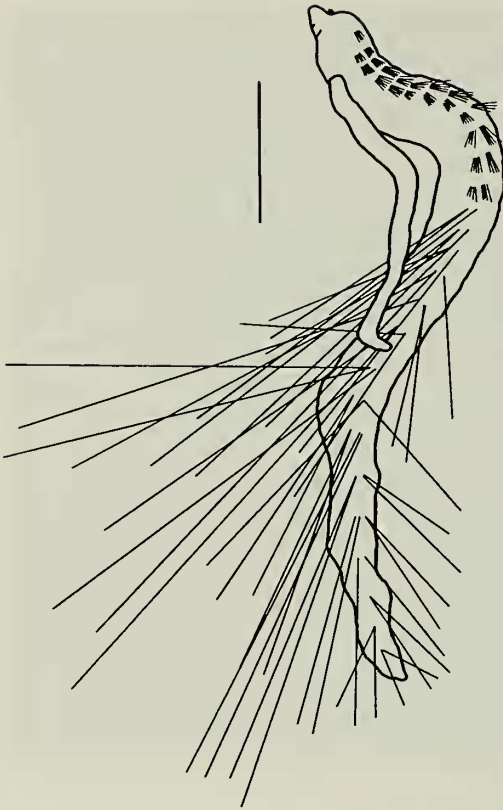


Fig. 3. *Cossura consimilis*, new species. Juvenile with natatory capillaries. The 27 chaetiger individual is near complete but its branchial filament is shortened by breakage. Scale 0.5 mm.

in density in response to local man-induced sediment changes (Olgard & Hasle 1993), there are no reports of them as trans-oceanic adventive colonisers.

The specimens in the NIWA collection were taken from more than 70 locations (with multiple adjacent samples at some in-shore locations). The limited number of off-shore records is probably an artifact of past sampling techniques. Where appropriately fine sieving of 1 mm or less has been used on the Chatham Rise and off the western coast of the South Island, *Cossura consimilis* has been recorded from shelf to slope depths. However, most records are coastal or comparatively near shore, with occurrences in several major North Island harbours. On the South Island coast *C. consi-*

*milis* has been found to be widespread in inner Lyttelton Harbour (R. Asher, pers. comm.), also occurring in Timaru Harbour and Milford Sound, but has yet to be recorded from Otago Harbour, even though there has been extensive sampling there (e.g., Rainer 1981, Grove & Probert 1999, and K. Probert, pers. comm.). *Cossura consimilis* also occurs further south in Stewart Island waters.

In incomplete worms the posterior part of the body had broken off anterior to the start of the 2nd body region in 59.6% of worms ( $n = 52$ , Big Glory samples), and the break averaged between the 25th and 26th segment (25.16, range 17–29,  $n = 31$ ). This indicates that fragmentation on collection is not mainly in the thinner-walled 2nd region (beginning around chaetiger 30) as might be expected. The division into two body regions is not sharply demarcated in *C. consimilis*.

The juvenile benthic *C. consimilis* specimens with extraordinarily-long fine chaetae are unlikely to have retained planktonic-larva chaetae through to such a late stage, and Bachelet & Laubier (1994) showed that juveniles of *Cossura pygodactyla* have developed adult-type chaetae as early as a four chaetiger stage. A stronger possibility is that a semi-planktonic dispersal phase may occur post-settlement in young worms so equipped with these 'natatory' chaetae. Planktonic cossurid larvae have never been reported with one possible exception; Berkeley & Berkeley (1960) reported a single incomplete "larva" of 22 segments, 2 mm long, with "very long fine larval capillaries." Because of the large size of the specimen I suggest it was not a larval form but rather a post-settlement individual similar to those described here. There are at least two other prior reports of similar unusually long chaetae in postlarval non-reproductive polychaetes. These are the genus *Paraprionospio* spionids of 60 chaetigers found in plankton off Peru (Berkeley & Berkeley 1963), and the asexually-generated young benthic ctenodrilids of genus *Rar-*

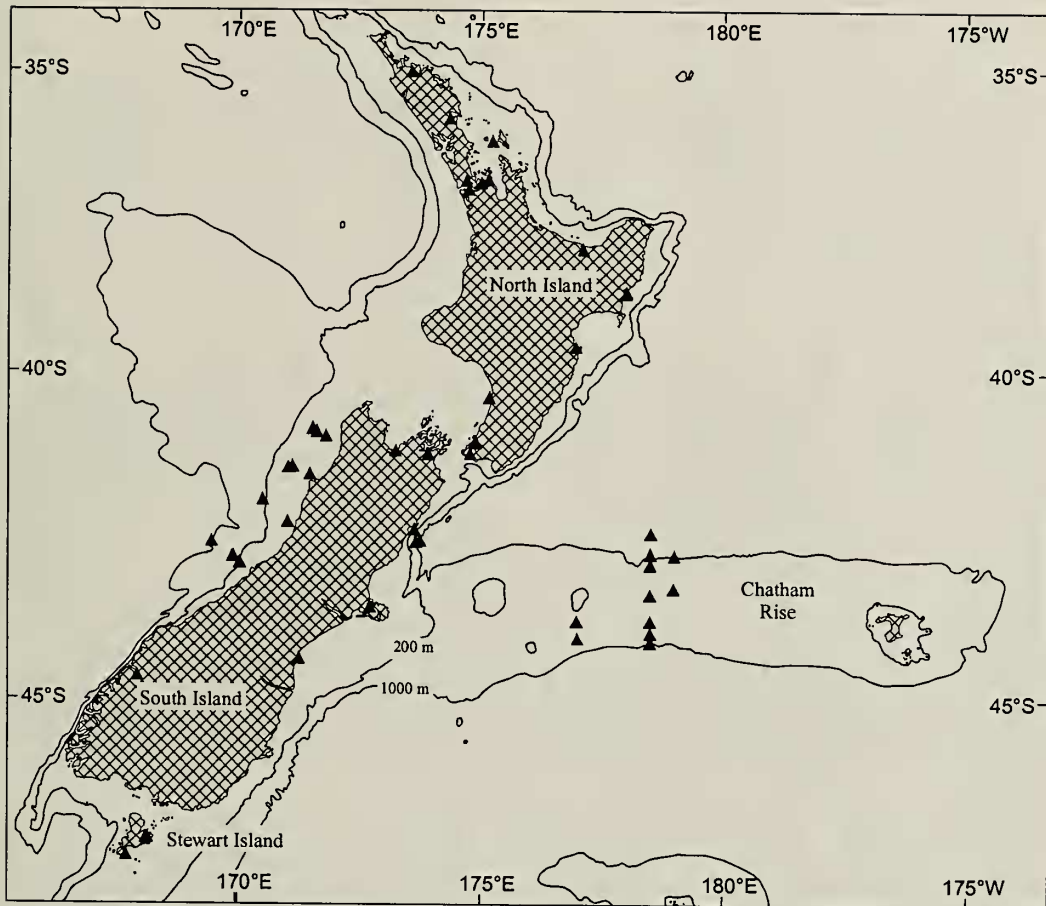


Fig. 4. Distribution of *Cossura consimilis*, new species, in the New Zealand region. Several of the coastline datapoints represent multiple stations (see material examined).

*icirrus* that Petersen & George (1991) called "dispersal forms".

Methyl green staining was of the basic cossurid pattern and not highly distinctive, except that wedge-shaped blocks were not seen just anterior to the branchial filament, contrary to the pattern in several *Cossura* species off California (Hilbig 1996).

Remarkably, 16 cossurid species are reported from North or South America, including 12 from the Pacific coast (Table 1). Hilbig (1996) was able to recognize several sympatric species from seas at and north of the Point Conception region of California, with up to three species in the same sample. If, as Hilbig maintains, *C. rostrata* is indeed

distinct from the very similar *C. candida*, then six cossurids coexist in this area. Further south the purported four species off the South American Pacific coast are all inadequately described. Of the species outside the Americas four are from the seas around China and Japan, two from the Indian Ocean, and one from the Mediterranean. However, most species are unknown outside their type localities. The four species with possibly wider distributions are: the Californian species *Cossura pygodactylata* Jones, 1956 and *C. brunnea* Fauchald, 1972, both also recorded off the North American Atlantic coast (Hilbig 1996), and the latter also from Korea (Paik 1997); *Cos-*



Table 1.—Characters from original descriptions of *Cossura* (including *Cossurella*) species, ordered by branchial filament placement then date of description. *Cossura lepida*, a synonym of *C. pygodactylata*, is included as a separate entry. Data enclosed by square brackets is from subsequent authors (identified in Remarks column). Distribution data excludes non-taxonomic papers and records categorized as questionable in prior papers.

Species	Anterior chaetigers	Anal cirri	Specimen numbers <sup>a</sup> & maximum dimensions <sup>b</sup>	Depth (m) & sediment	Type locality, further records	Remarks
Branchial filament arising from posterior of chaetiger 2						
<i>C. longocirrata</i> Webster & Benedict, 1887	[16–21]	3 long	1c 0.8 by 19 by 70	[7–887], mud	Maine, [eastern N. America, Arctic, Denmark]	[Fournier & Petersen 1991]
<i>C. pygodactylata</i> Jones, 1956	13–21	3 long	85 (15c) 0.3 by 12 by 64	[1–2720], mud	California, [N. American coasts, S. France & Spain]	6–10 intercirral processes [Hilbig 1996]
<i>C. soyeri</i> Laubier, 1963	31 [20–31]	unknown [3 long]	2 0.4 by ? by ? [0.35 by >7 by >45]	35, [muddy sand]	S. France, [Mediterranean, N. Gulf of Mexico]	incomplete [Bachelet & Laubier 1994]
<i>C. heterochaeta</i> Orensanz, 1976	—	unknown	4 ? by >9 by >37	150–310, sand-mud	Argentina	incomplete anterior neurosetal spines
<i>C. lepida</i> Tamai, 1986 (= <i>C. pygodactylata</i> (fide Hilbig 1996))	13	3 long	21 (1c) 0.3 by 12 by 64	2–21, mud	Japan	20 intercirral processes
Branchial filament arising from anterior of chaetiger 3						
<i>C. laeviseta</i> Hartmann-Schröder, 1962	14?	3 short	13 (1c?) 0.4 by >2.5 by >21	7, —	Peru	ventral peristomial 'eye' pair (pigment spots?) incomplete
<i>C. chilensis</i> Hartmann-Schröder, 1965	—	unknown	5 0.4 by >4 by >28	50–160, mixed	Chile	incomplete
<i>C. abyssalis</i> Hartman, 1967	—	unknown	9 0.5 by >4 by >23	3655, —	Chile	incomplete
<i>C. sina</i> Fauchald, 1972	28	unknown	11 1.5 by >26 by >55	2307–3544, —	W. Mexico	dark spots, spines present
<i>C. dayi</i> Hartman, 1976	—	unknown	465 ? by >7 by ?	16–1006, —	Indian Ocean	incomplete
<i>C. aciculata</i> (Wu & Chen, 1977) new combination	22	unknown	>2 2 by >75 by >112	6, —	China	incomplete spines present
<i>C. duplex</i> Tamai, 1986	14	3 short	45 (1c) 0.5 by 22 by 90	4–16, mud	Japan	biannulate anteriorly
<i>C. pseudakaina</i> (Ewing, 1987) new combination	27–30	1 short, plus papillae	4 (1c) 0.6 by 14 by 81	104–570, sand-mud	Gulf of Mexico, Caribbean Sea	“spines” present

Table 1.—Continued.

Species	Anterior chaetigers	Anal cirri	Specimen numbers <sup>a</sup> & maximum dimensions <sup>b</sup>	Depth (m) & sediment	Type locality, further records	Remarks
<i>C. consimilis</i> new species	28–32	3 long	816 (8c 23t) 0.7 by 17 by 90	0–2330, fine sand-mud	New Zealand	—
<i>C. candida</i> Hartman, 1955	24–35	3 long	Branchial filament arising from midlength of chaetiger 3 ~300 (?c > 1t) 1.0 by 19 by 150	11–2400, sand-mud	California, W. Mexico	—
<i>C. delta</i> Reish, 1958	—	unknown	~100 (0.5 by 66 by >25) <sup>c</sup>	inshore, clay	N. Gulf of Mexico	incomplete
<i>C. coasta</i> Kitamori, 1960	—	3 long, branched	~100 (2c) 0.6 by 15 by 107	inshore, —	Japan <sup>d</sup>	—
<i>C. brunnea</i> Fauchald, 1972	16–18	3 long	36	[1600–2200], "mixed"	California, [N. American coasts & offshore, Korea]	incomplete, body brown [Hilbig 1996, Paik 1997]
<i>C. rostrata</i> Fauchald, 1972	19–21	[3 long]	0.5 by 8 by >63 16 1.2 by >11 by >57	[6–3348], sand-mud	W. Mexico, [W. N. America]	setae notably hairy [Hilbig 1996]
<i>C. bansei</i> Hilbig, 1996	20–31	3 long?	Branchial filament arising from posterior of chaetiger 3 ~10 (?t) 0.5 by >6 by >71	18–160, sand-silt	California, W. N. America	—
<i>C. dimorpha</i> (Hartman, 1976) new combination	29	unknown	Branchial filament arising from anterior of chaetiger 4 30 0.8 by >10 by >48	34–110, —	Mozambique, N. Indian Ocean	incomplete spines present
<i>C. pettiboneae</i> (Ewing, 1987) new combination	23	unknown	6 1.5 by >34 by >73	257–530, sand-mud	Puerto Rico	incomplete spines present, body brown
<i>C. modica</i> Fauchald & Hancock, 1981	[14–26]	[3 short]	Branchial filament arising from posterior of chaetiger 4 40 0.5 by >6 by >35 [0.5 by 16 by 127]	[985–2955], sand-silt	Oregon, [California]	incomplete [parapodial lobes posteriorly, extra long filament (Hilbig 1996)]
<i>C. alba</i> Hartman, 1967	—	unknown	1 1.5 by >16 by >23	957, —	Chile	filament arises at 4/5 border

<sup>a</sup> All specimens are incomplete with tail sections unknown except as noted ((c)omplete, (t)ails).

<sup>b</sup> Dimensions are width by length by chaetiger number (prefixed by > if incomplete); lengths rounded to the nearest millimeter and width to nearest 0.1 mm.

<sup>c</sup> The *Cossura delta* holotype is abnormally long relative to the number of chaetigers (and to paratypes); the length as published may be a transcription error.

<sup>d</sup> The *Cossura coasta* recorded from the Eastern Mediterranean (Bogdanos & Fredj 1983) appears likely to be a misidentification.

*sura longocirrata*, which may have an ampho-Atlantic occurrence (Fournier & Petersen 1991), although first described from Maine; and *C. soyeri* Laubier, 1963 from the Mediterranean and the northern Gulf of Mexico (Bachelet & Laubier 1994). *Cossura pygodactylata* has also been further recorded from the Bay of Biscay (Bachelet & Laubier 1994), and from Japan (as *Cossura lepida* Tamai, 1986 (fide Hilbig 1996)). *Cossura soyeri* Laubier, 1963 from France is distinct from *C. delta* Reish, 1958 from Gulf of Mexico, although synonymy was advocated by Granados-Barba & Solis-Weiss (1997).

There has yet to be a comparison of types of the putative 23 species. Since 16 of those species were described from incomplete specimens (i.e., head-end fragments only) there may be little benefit from so doing (for the same reasons a table rather than a key has been presented here). Of all cossurids only *C. pygodactylata* was described from several intact specimens. For all other species combined the number of intact cossurids examined is only six specimens in total, with nine species based on rather inadequate material (<10 incomplete specimens). Intact cossurids are very rare in benthic collections, and body pieces other than anterior ends may be mostly discarded unrecognized by sorters.

*Cossura consimilis* is one of nine species with the dorsal filament arising from the anterior part of chaetiger 3 (Table 1). Of these species, *C. laevichaeta* (Peru) is unique for possessing what were described as ventral 'eyes' (pigmented subdermal structures) on the peristomium and has 3 short anal cirri; *C. duplex* (Japan) has biannulated segments and short anal cirri; *C. pseudakaina* (Gulf of Mexico) has one short cirrus plus papillae; *C. sima* (W. Mexico), *C. aciculata* (China) have thickened chaetae in posterior segments ('*Cossurella*' group); *C. chilensis* (Chile), *C. abyssalis* (Chile), and *C. dayi* (Indian Ocean) are inadequately characterised from incomplete material. Hartman (1976) erected the new name *C. dayi* osten-

sibly for *C. coasta* sensu Day, 1963, which has the branchia on the anterior edge of chaetiger 3 rather than at midlength as in *C. coasta* Kitamori, 1960. However, her description was based only on her own incomplete specimens, which were not from the same geographic area as Day's. Next, if the five species in which the filament is midlength chaetiger three are compared to the New Zealand *Cossura consimilis*, then *Cossura rostrata* (Western Mexico) and *C. candida* (California) appear to be the most similar of this group, but differ in staining pattern as well as branchia position. None of the five species in which the filament is at the posterior of chaetiger two appear to be close in other characters to the New Zealand *C. consimilis*. Finally, species with a similar number of anterior-region chaetigers are: *Cossura sima* and *C. dimorpha* (with spines); *C. pseudakaina* (single posterior capillaries); and *C. candida* (filament arising from midlength of chaetiger three).

It is with some reluctance that I have added another *Cossura* to the genus. I believe that this species does not fit comfortably into any of the previous good descriptions, and that there is little prospect of resolving those that have been inadequately described. As there are no *Cossura* species described yet from New Zealand, Australia, and neighboring South Pacific regions, I elect to provide a benchmark description and establish a name based on the extensive material held at NIWA.

*Etymology*.—The specific name is from the Latin *consimilis*, meaning "like in all respects." Its derivation follows the example of *Cossura modica* Fauchald & Hancock, which was also named for its ordinariness, as the New Zealand species is unique only by its combination of features.

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#### Appendix I Material examined

Samples collected by NIWA (station identifier a letter followed by 4 digits) unless indicated otherwise, arranged in North-South locality order and in alphanumeric order of station within locality. Specimen counts in parenthesis if more than one; sediment type noted as available; sampler abbreviations are 'CB' box corer, 'DA' anchor box dredge.

Mangonui Harbour, 35°00'S, 173°33'E: (2), 0 m, soft sand, hand, G. Read, 15 Feb 1979.

Portland, Whangarei Harbour, 35°48'30"S, 174°20'36"E: (28), T12, 0 m, sandy mud, hand, R. Mason, 1977.

Hauraki Gulf, 36°11'12"S, 175°13'30"E: I0052, 63 m, Agassiz trawl, 9 May 1975.

Te Makuku Bay, Waiheke Island, 36°50'20"S, 175°8'9"E: (2), Z9029, 0 m, muddy sand, hand, 13 Feb 1998.

Waitemata Harbour, 36°50'43"S, 174°41'20"E: (12), L9860, 4 m, muddy fine sand, B. Hayward, Auckland Museum AK130784, 11 Jan 1995.

Pine Harbour marina, Tamaki Strait, 36°53'18"S, 174°59'12"E: (2), PH9, 3 m, sandy mud, R. Cole, 1997. (153) (stations Z9644–46 include 60 samples), Z9644, 17 Jun 1998, Z9645, 16 Jul 1998, Z9646, 28 Sep 1998, 2–6 m, sandy mud, diver dredge, R. Cole.

Pollok Beach, Manukau Harbour, 37°0'0"S, 174°43'59"E: S0696, 0 m, hand dredge, 23 Aug 1986.

Ohiwa Harbour, 37°59'S, 177°6'E (approx): (276) (one complete), 0 m, hand, pooled stations of unpublished MAF Ohiwa Survey, J. Akroyd, voucher set in NIWA collection, Jan 1980.

Gisborne, 38°41'19"S, 178°0'E: (15), stations of Roper et al, 1989, 10 m, D. Roper, voucher set in NIWA collection, 1984. 38°42'54"S, 177°59'24"E, Z9717, 20 m, muddy sand, 1 Feb 1999, R. Cole.

Clive, Hawke Bay, 39°34'48"S, 176°57'12"E: (86(6 complete)), April 1976, 4–16 m, fine sand to very fine silt, grab, 37 specimen lots from 28 stations, G. Knox & G. Fenwick, NIWA Knox collection. 39°34'33"S, 176°58'E: (25), 4–16 m, MOWD outfall survey, D. Roper, voucher set NIWA collection, 1984.

Offshore Wanganui, 40°23'24"S, 175°10'26"E: Z6528, 33 m, muddy sand, Shipek grab, 23 Mar 1989.

Pauatahanui Inlet, 41°5'59"S, 174°52'59"E: M0006A, 0.5 m, mud, suction dredge, 01 Nov 1974. M0042A, 0.5 m, suction dredge, 08 Feb 1975. 41°06'S, 174°54'E: (10), 1.5–2 m, mud, hand core, G. Read, 21 Apr 1979, 12–13 May 1984.

Wellington Harbour, (5 total from 5 adjacent sta-

tions), 41°16'0"S, 174°46'59"E: Z8238, Z8239, Z8240, Z8246, Z8273, 7 m, mud, 1 Mar 1993.

Tasman Bay, 41°13'29"S, 173°14'24"E: C0479, 9 m, soft mud, orange-peel grab, 9 May 1960.

Pelorus Sound, 41°16'12"S, 173°55'11"E: C0939, 9 m, soft mud, orange-peel grab, 12 Feb 1963.

Offshore western South Island, (20 total from 18 stations), 41°28'47"S, 171°1'36"E: Q0703, 202 m, muddy sand, 4 Feb 1982. 42°56'41"S, 170°1'36"E: S0371B, 194 m, mud, CB, 8 Jan 1983. 42°51'11"S, 169°52'30"E: S0374A, 496 m, mud, CB, 9 Jan 1983. 42°50'48"S, 169°53'48"E: (2), S0374C, 464 m, mud, CB, 9 Jan 1983. 42°37'18"S, 169°26'42"E: S0377A, 975 m, mud, CB, 9 Jan 1983. 42°19'36"S, 171°1'0"E: S0382B, 124 m, mud, CB, 2 Feb 1983. 41°58'54"S, 170°30'11"E: S0385A, 497 m, muddy sand, CB, 3 Feb 1983. 40°59'48"S, 171°48'24"E: S0393B, 127 m, sandy mud, CB, 7 Feb 1983. 41°35'24"S, 171°28'12"E: (2), S0394A, 127 m, mud, CB, 8 Feb 1983. 41°35'24"S, 171°28'23"E: S0394B, 126 m, mud, CB, 8 Feb 1983. 41°35'24"S, 171°28'36"E: S0394C, 125 m, mud, CB, 8 Feb 1983. 41°27'47"S, 171°6'47"E: (2) S0395A–B, 178 m, mud, CB, 8 Feb 1983. 40°55'36"S, 171°37'0"E: S0397C, 154 m, sandy mud, CB, 9 Feb 1983. 40°51'59"S, 171°31'59"E: S0398, 175 m, muddy sand, CB, 10 Feb 1983. 40°52'48"S, 171°31'36"E: S0398C, 177 m, muddy sand CB, 9 Feb 1983. 42°31'0"S, 170°10'0"E: S0895A, 836 m, sandy mud, 9 Jul 1991.

Offshore Kaikoura, (26 total from 3 stations), 42°26'23"S, 173°37'54"E: (3), U0231, 38 m, sand, 8 Dec 1982. 42°38'5"S, 173°39'38"E: (3), U0247, 120 m, muddy sand, 1 Dec 1982. 42°36'42"S, 173°44'50"E: (20) U0263, 1496 m, mud, 5 Dec 1982.

Chatham Rise, (30 total from 20 stations), 42°29'43"S, 178°30'47"E: S1049K, 2330 m, CB, 30 Apr 1997. 42°48'16"S, 178°30'19"E: S1053A, 1016 m, mud, CB, 1 May 1997. 42°48'32"S, 178°30'29"E: S1053K, 1004 m, mud, CB, 1 May 1997. 42°48'29"S, 178°30'11"E: (2), S1053L, 1005 m, mud, CB, 1 May 1997. 42°58'19"S, 178°30'26"E: S1054B, 453 m, mud, CB, 1 May 1997. 42°58'19"S, 178°30'18"E: (2), S1054C, 455 m, mud, CB, 1 May 1997. 43°25'52"S, 178°29'43"E: (3), S1055B, 348 m, CB, 2 May 1997. 43°25'54"S, 178°29'35"E: (2), S1055C, 348 m, CB, 2 May 1997. 43°49'38"S, 178°29'50"E: S1060D, 452 m, muddy sand, CB, 3 May 1997. 43°49'37"S, 178°30'13"E: S1060H, 451 m, muddy sand, CB, 3 May 1997. 44°8'31"S, 178°29'55"E: S1065G, 994 m, CB, 5 May 1997. 43°25'59"S, 178°29'53"E: (4), S1066C, 350 m, muddy sand, CB, 6 May 1997. 43°26'0"S, 178°30'1"E: S1066D, 348 m, muddy sand, CB, 6 May 1997. 44°0'13"S, 178°30'16"E: (2), S1071B, 757 m, CB, 7 May 1997. 44°0'10"S, 178°30'10"E: S1071C, 757 m, CB, 7 May 1997. 42°58'32"S, 178°29'38"E: (2), S1072D, 442 m, muddy sand, CB, 7 May 1997. 42°49'50"S, 178°59'32"E: V0369, 1048 m, DA, 1 Sep 1989. 43°20'7"S, 178°58'52"E: V0372, 418 m, muddy sand, DA, 3 Sep

1989. 44°5'4"S, 177°0'0"E: V0378, 663 m, muddy sand, DA, 4 Sep 1989. 43°49'28"S, 176°58'54"E: V0379, 495 m, DA, 4 Sep 1989.

Timaru Harbour, (5 total from 4 stations), 44°23'33"S, 171°15'15"E: Z9045, 10 m, mud, 11 Apr 1998. 44°23'32"S, 171°15'18"E: Z9046, 12 m, mud, 11 Apr 1998. 44°23'33"S, 171°15'24"E: Z9047, 10 m, mud, 11 Apr 1998. 44°23'12"S, 171°15'49"E: (2), Z9059, 11 m, mud, 12 Apr 1998.

Milford Sound, 44°39', 167°55'E: (5), Galathea Station 613, 214 m, mud, Petersen Grab, Galathea Expedition, (Zoological Museum, University of Copenhagen collection), 19 Jan 1952.

Stewart Island, Big Glory Bay (88 total from 9 stations, 1 complete, also 23 tail ends) 46°58'48"S,

168°8'8"E: Z9248, 25 m, core, 13 Mar 1998. 46°58'34"S, 168°7'58"E: Z9251, 25 m, core, 14 Mar 1998. 46°59'9"S, 168°7'36"E: (2), Z9252, 27 m, sandy mud, core, 14 Mar 1998. 46°58'54"S, 168°7'31"E: (10), Z9253, [HOLOTYPE] 26 m, sandy mud, core, 15 Mar 1998. 46°58'41"S, 168°6'53"E: (16), Z9254, 27 m, sandy mud, core, 15 Mar 1998. 46°58'43"S, 168°6'23"E: (7), Z9255, 25 m, core, 16 Mar 1998. 46°58'54"S, 168°6'19"E: (17), Z9256, 27 m, sandy mud, core, 16 Mar 1998. 46°59'13"S, 168°6'29"E: (13), Z9257, 27 m, core, 16 Mar 1998. 46°58'58"S, 168°6'4"E: (21), Z9258, 26 m, core, 17 Mar 1998.

Stewart Island, Port Pegasus, 47°14'S, 167°42'E (approx.) (19), PP1-PP4, 45 m, J. Lowry, NIWA G. Knox collection, 23 Mar 1972.